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SCIENCE INTERPRETIVE PROGRAM--SPERMACETI COVE INTERPRETIVE CENTER.

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DESCRIBED IS THE OUTDOOR EDUCATION PROGRAM FOR THE MIDDLETOWN, NEW JERSEY ELEMENTARY SCHOOLS AT THE SPERMACETI COVE INTERPRETIVE CENTER IN SANDY HOOK STATE PARK. THE PROGRAM IS FUNDED UNDER PL89-10 OF THE ELEMENTARY AND SECONDARY EDUCATION ACT (ESEA). PHASE 1 (MARCH, 1966-JUNE, 1966) INVOLVED THE SELECTION OF NINE PUBLIC AND THREE PAROCHIAL FOURTH GRADE CLASSES TO PARTICIPATE IN A GEOLOGY PROGRAM ENTITLED "A HANDFUL OF SAND." THE GOAL OF THE GEOLOGY PROGRAM IS TO TRACE BEACH SAND TO ITS ROCK ORIGIN, EXAMINE THE FORCES THAT RELEASE AND TRANSPLANT THIS MATERIAL, AND STUDY THE NEED FOR CONSERVATION IN SHORE AREAS. IN PHASE 2 (SEPTEMBER, 1966-JUNE, 1967) 40 FOURTH-GRADE CLASSES FROM MIDDLETOWN ELEMENTARY SCHOOLS ATTENDED THE GEOLOGY PROGRAM. FIFTEEN GRADE 5 CLASSES ATTENDED A PILOT BIOLOGY PROGRAM. THE BIOLOGY PROGRAM DEVELOPS CONCEPTS RELATED TO THE PRODUCER-CONSUMER-DECOMPOSER RELATIONSHIPS EXISTING IN THE ENVIRONMENT. PHASE 3 (SEPTEMBER, 1967-JUNE, 1968) INVOLVED ALL THE MIDDLETOWN AREA FOURTH AND FIFTH GRADES ATTENDING THEIR RESPECTIVE PROGRAMS AT THE CENTER. FIFTEEN GRADE 6 CLASSES ATTENDED A PILOT MARINE BIOLOGY PROGRAM. THE GRADE 6 PROGRAM DEVELOPS THE BROADER CONCEPTS OF THE VALUE, USE, AND CONSERVATION OF MARINE AND ESTUARINE AREAS. DESCRIPTIONS OF PROGRAM OBJECTIVES, THE GRADE 4, 5, AND 6 PROGRAM COURSES OF STUDY, AND PROJECTED PLANS ARE INCLUDED. (RS)

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SCIENCE INTERPRETIVE PROGRAM

E. S. E. A. PL 89-10, T-111

Spermaceti Cove Interpretive Center

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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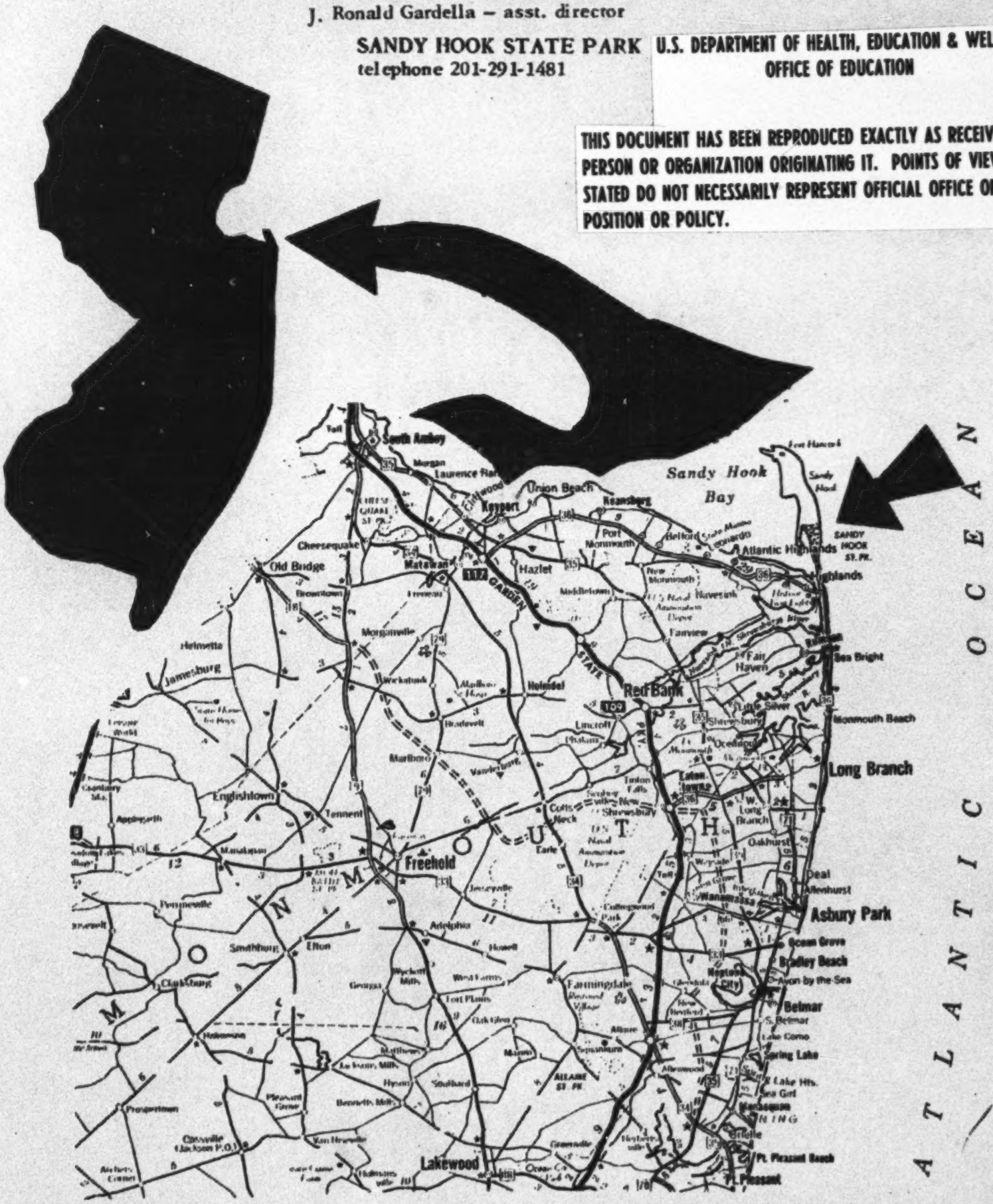

SUPPLEMENTARY SCIENCE INTERPRETIVE CENTER

(OE No. 66-532)

under

PUBLIC LAW 89 - 10

Middletown Township Public Schools
Spermaceti Cove Interpretive Center
Middletown Township Board of Education
Box, 57, Highlands, New Jersey 07732

MIDDLETOWN TOWNSHIP BOARD OF EDUCATION
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Middletown Township's School Interpretive Program at Sandy Hook State Park

In November of 1965, a conference was held in Trenton, with Mr. Robert W. Ward, Assistant Director of Curriculum and Instruction for the New Jersey Department of Education. The intent of this conferenc was to establish a teachers in-service training program at Sandy Hook State Park. Mr. Ward suggested a broader approach by encouraging the development of a teacher-child oriented program. This program could then be funded under the then new Elementary and Secondary Education Act of 1965 (E.S.E.A.). This Act, under Title III of Public Law 89-10, provides federal funds for the planning and operation of innovative educational programs. These programs are intended to supplement, not supplant, current school programs. The goal of the Title III aid is to produce during the three year funding period exemplary programs so valued by local and other school systems that the financial burden of continuation will be willingly assumed by these groups when federal financing ceases.

By having both students and teachers attend the Sandy Hook Supplementary Educational Programs, the goal of in-service training would be fulfilled, and students would gain valuable experience in the outdoors. The obstacles encountered in establishing a program using state facilities, federal funds, and a program administered and staffed by a local Board of Education might seem insurmountable. At Sandy Hook these problems were eased by the existing active cooperation between the State Park System and local educators. A joint program had already been established through the use of local teachers as part time park naturalists and instructors in summer school programs. The increasing need for public conservation education also provided a common meeting ground for state officials and educators alike.

Middletown Township was selected as the pilot area for several important reasons. Sandy Hook is part of the Middletown School System. This system's large geographic area, nearly 39 square miles, has a student enrollment of over 12,000 children. These students provide a good experimental profile of varied communities. Inland surburban settlements and bayshore towns are served equally in our program. Within this community profile we find children with affluent backgrounds being schooled with children from economically and culturally deprived homes. One child in our program kept pointing to his father's yacht anchored just off-shore. Another student had never seen the ocean, though he lived only six miles from the shoreline. Now that we are progressing beyond the pilot phase, our programs are being offered to schools beyond the Middletown area.

The difficulties in writing a program for federal approval were eased by the wealth of survey materials developed during previous park programs which covered a broad spectrum of study in the natural areas. The program authors, Richard C. Cole and J. Ronald Gardella, part-time naturalists at the park and full-time instructors at Middletown High School, were well qualified for the task of project design. The program, coordinated by both state and local administrators, was submitted to the Department of Health, Education and Welfare (H.E.W.) for approval.

On January 28th, 1966, the H.E.W. office informed the Middletown Township Board of Education that funds were approved for the Sandy Hook Interpretive Project (Project OE No. 66-532). A sum of $37,000 was granted for a five month pilot operational period ending June 30, 1966. Although general approval is given only for each current fiscal year, subsequent fiscal approvals over the three year period will total $180,000.

The federal grant has changed the "make do" atmosphere of the Nature Center into one of more scientific approach. Rows of formica tables and chairs, cabinets lined with microscopes and binoculars, office equipment, salt-water aquariums on display, library shelves stocked with research materials, and a mobile science van for outside area programs all enrich the student learning environment.

The Sandy Hook Program, unlike many other Title III programs, is not a resident type education. The participating classes are bussed directly from their classrooms to the Spermaceti Cove Nature Center in the park. After each day's program the children are returned to their classroom on the mainland. The average period of program attendance for each fourth and fifth grade Middletown class has been 1½ hours per day for three-day and four-day programs. School districts beyond the local area are offered a choice of programs. These programs are flexible to meet the needs of the applicants, and range from a one-day offering of the condensed grade level programs (which are normally nearly a week in extent), to guided walks in the natural areas.

Program Objectives

The objectives of the Sandy Hook Interpretive Program are the following:

1. An understanding of natural phenomena, concepts and principles that are part of the child's environment.

2. An understanding and appreciation of our natural resources and the need for their conservation.

3. The development of love of our country through an intimate identification with our environment.

4. An understanding in the use of manipulative, experimental and problem-solving skills which are utilized in science.

5. An understanding of the vocational and avocational aspects of science.

6. The development of habits and attitudes such as openmindedness, intellectual and scientific integrity, respect for human differences, and social adjustments of the individual.

Before explaining each program in detail, an overview of program expansion will prove helpful.

Phase I (March "66- June "66) The beginning of the Pilot Fourth Grade Geology Program, Program Theme- "A Handful of Sand". Nine Public and three Parochial classes were selected from twelve of the fifteen Middletown Elementary Schools.

Phase II (September "66- June "67) All fourth grade classes in Middletcwn Township (40 classes) attended the Sandy Hook program. Fifteen fifth grade classes, each class selected from a representative school, attended the pilot Biology Program. Program Theme- "The World of the Bird Feeder". Several one day programs were tried with outside area schools. These schools were offered, in one day, the highlights of the normal week-long elementary programs. Reports from the experimental schools indicate a great interest in future program involvement.

Phase III (September "67-June "68) All fourth and fifth grades in the Middletown area (80 classes) attended a week of program activities at Sandy Hook. Fifteen pilot sixth grades,one from each school, attended a Marine Biology Program. Program Theme- "Our World in a Fishbowl". One day programs in the arts, science, and social sciences will be offered to any non-profit educational group, Kindergarten through college, which makes application. Approximately 150 field and laboratory days are provided for these visiting classes.

The Elementary Geology Program

Teaching basic geology to fourth graders becomes difficult if over-technical methods are used. The theme of the program, "A Handful of Sand" is the keynote to our basic approach in teaching barrier beach geology. The goal of students during the week of activities is to trace beach sand to its rock origin, examine the forces that release and transport this material, and study the need for conservation in these shore areas.

Before a pilot class attends the program at Sandy Hook, the teacher is invited to the nature center for a program conference. During this visit the program is explained, and a teacher's guide, containing student program activities and answer keys, is provided.

On the first day of class attendance, the students are bussed from their mainland classrooms to the Park's Nature Center. After the program introduction, the students are issued binoculars and are guided through the wildlife areas. Although geology is emphasized during this walk, the naturalist-guides point out the biologic features of the marsh, shorelines, and holly forest. Students examine the huge stick nests of the fish hawks, and ponder the probable origin of the skull and crossbone design carved on one of the ancient holly trees. During the three remaining days of their program the students complete the following study projects.

A. The Birth of a Rock - This day of laboratory experience introduces the students to the crystal concept of rock structure. It is explained that rocks are classified by their difference in mineral content. Rocks are compared to cakes, since cake names vary with the ingredients used. A stereomicroscopic examination of salt and sugar crystals is completed by each student. Crystals are grown from supersaturated salt solution, and the days activities end with a microscopic search for crystals in fragmented rock.

B. The Birth of Ocean and Beach - This laboratory study takes students on an imaginary trip to the beginning of time to witness the birth of continents and oceans. "Discovery Sheets", which are illustrated problem-guides, encourage student understanding of the water cycle and some of the effects of weathering and erosion. Miniature mountains of sand, gravel, and water, hardened in freezers, now undergo rapid changes in a spray of simulated rainfall. In a few minutes the micro-formation of river valley, delta, continental shelf and beach area can be observed. By siphohing some water from the demonstration tray the student can observe how a continental shelf becomes a coastal plain. This micro-plain area is compared to a relief map to indicate the watery origin of southern New Jersey. A stream of water, directed along this demonstration coastline, produces a barrier beach "Hook" formation in minutes.

C. Beach and Dune Conservation - Students study the erosional nature of wind driven sand by using a "Dune Machine". These machines are vacuum cleaners, with hose reversed, that blow a stream of sand through a baffle of shells, grass and stones arranged on an observation table. Miniature dune deposits can be observed as they form around the obstacles. The class then participates in a dune conservation program by placing dead christmas trees in rows along the dune area. A mile of parallel dunes, some 12' high, have resulted from this project. The day's program is completed with a collecting hike along the shore. Students collect seashells and beach oddities before bus departure time.

In the fourth grade study of geology, a day to day continuity is important. The examination of salt and sugar crystals shows variation in crystal shapes while the development of crystals from solution shows their fluid origin. The discovery that rock fragments are made of crystals leads to the student assumption that rocks developed from a fluid. The following days study of weathering and erosion shows the students how minerals are released from their rocky prisons and transported to new areas. The miniature mountain demonstration depicts topographical formations such as valleys, rivers, deltas, a continental shelf, and the coastal plain. Beach sediments have now been traced from mountain to shoreline. The use of the dune machine shows the embryonic origin of dune formation and emphasizes the need for conservation in these areas. The conservation field day allows the student to participate directly in dune control. The "Christmas Tree Project" creates an area for observing dune growth through sucessive years of student attendance in programs at Sandy Hook State Park.

The Fifth Grade Biology Program

Many of the adults who participate in nature walks at the park have somehow during their youthful days escaped the concepts of green plant importance. Probably those processes by which sun's energy is converted into needed food are somewhat taken for granted.

Our approach in teaching biology to elementary students hinges on the producer-consumer-decomposer relationships existing in daily life. These relationships are found through a program study of "The World of the Bird Feeder".

During the teacher's pre-program conference period, a bird feeder and seed are provided for class use. The feeder is established on the local school grounds, preferably near the participating classroom. Prior to program attendance the students study the activities around the feeder and plant some of the seed for the study of plant growth. The producer-consumer relationships are them established before the students arrive at the park for the program.

On the day of arrival the students shout cheery greeting as the bus pulls into the unloading zone. The previous year's program is still fresh in mind and the children look with interest toward another period of outdoor activity.

After a brief introduction, the students are provided with "Discovery Sheets" to solidify producer-consumer relationships. The student connects with a line common foods and the plant or animal they come from to the energy source: in the sun. These interwoven relationships are used to introduce the food chain-food web concept. The students then take a self-guided walk along a special educational trail for a "Discovery of the Green World". Numbered trail posts and guide booklets lead the students along a meandering trail through thicket and sand areas. The Fall and Spring fifth grade schedule finds the trees in leaf and the many bird feeders along the trail busy with resident and transient visitors. A zoned area of sand is reserved for animal track study and students are asked to interpret the stories left in the sand.

During the remaining days the classes complete the following activities:

A. The Roof of the Green World - This day of laboratory experience is devoted to the cell and vein structure of the leaf, and the types of foods that plants produce. Before entering the classroom, leaves are collected for laboratory study. To emphasizethe color of the green world, chlorophyll is removed by rubbing a bruised leaf on a study square of the lab. sheet. The cell is them emphasized as the unit of structure in living things. The students remove skin from an onion, stain the tissue with iodine, and do a microscopic study of cell arrangement. Simplified drawings of the cycles involved in photosynthesis are studied by the students.

   The veins of the plant are studied in the "plumbing of the green world". This "plumbing" is identified as the vessel system for transporting produced food and raw materials in the plant. Large office ink pads are used to make non-messy leaf prints on study sheets. The students trace the vein imprints from the food production centers to the leaf stem. Plant-produced foods such as starch and sugar are studied with microscopes. A classical test for starch is to place iodine on the item to be tested. If starch is present, the iodine changes from a brown to purplish-blue. The students test potato slices and find starch present in this common plant-produced food. Through controls the experimental method of testing is introduced to the students.

B. The Consumers of the Green World - This is a combined lab.-field day for students. The varieties of food consumers are studied by using bird and mammal study skins, and insect collections.

In the shore area, birds are the most noticable animal for study. Teaching the children all the many different birds would be difficult in so limited a time, so a simplified method of instruction is used. " Let's Build a Bird" is a student project in which various silhouettes of necks, feet and beaks are combined to produce a bird adapted to live in a specific area. A sample problem might be "construct a marsh bird. This bird needs legs for wading, a neck for reaching fish, and a beak to spear them with". The resulting composite produces a heron-like body that is found in marsh birds. Predator birds, insect-eating birds, and other types are constructed by the students. An overhead projector with bird silhouettes is used to review the student study.

The field portion of the day's program may consist of a visit to the bird banding station in the Holly Forest. Mr. and Mrs. Richard Roche, Audubon banders from the Sherman Wildlife Sanctuary, net, identify, and band birds at Sandy Hook each week. Unusual birds are shown to the children and the banding procedure is explained.

C. Barrier Beach Bird Study - During this field experience the students participate in a bird survey that covers the area from beach to forest. Binoculars, check lists, silhouette bird keys, and clip boards are issued to each student.

D. Conservation - Part of the "birding" walk is through the dune area where these same children who were then fourth graders placed christmas trees for dune building. A continuation of dune conservation is stabilization of the shifting areas. When dune grass is available through the State Conservation Department, the children plant these grasses to anchor their sand area. This also emphasizes the value of green plants in areas other than food production.

The continuity followed through the fifth grade program identified the green plants as producers and the human, animals and non-green plants as consumers. It also establishes the important relationships between these living things and their surroundings. Conservation of our natural resources is emphasized throughout the program.

The Sixth Grade Marine Biology Program

As increasing land populations place more demand on our natural resources, we find a need for exploring the undeveloped wealth of the sea. The sixth grade marine program introduces elementary students to this area through a program theme "Our World in a Fish Bowl". A salt water aquarium in the classroom acts as a "springboard" for marine study. The broader concepts of the value, use, and conservation of marine and estuarine areas is the goal of the program.

During the teachers pre-program conference period, the participating pilot teachers spend a day at the Sandy Hook Nature Center. The program objectives, techniques, and daily schedules are explained during this orientation period. The students in the marine program pilot phase

receive pre-test and post test as part of the evaluation of the program. Due to the sea's prime productivity during the early Fall, these months are reserved for the marine program.

The Marsh - A Nursery of the Sea

During the 1st day of the program the students receive an introduction to marine and estuarine biology. An explanation of the food chain - food web concept is derived through the students' use of "discovery sheets". The relation of foods to the animals consuming them and the primary energy sources involved are studied.

The students walk to the wildlife areas for a salt marsh study. Plankton samples are collected from a tidal pool for later examination. Profile sheets and animal plant picture keys allow individual interpretation of each study zone. Nets, killie traps, and track study are all used for maximum exposure. Water samples are collected for pollution tests.

The class now returns to the lab-classroom. The class participates in a discussion of pollution and its causes. Agar plates, selective to the growth of coliform bacteria only, are used to test three water samples. One sample is a sterile control, one from a known polluted area, and one from the marsh area. The test plates are placed in an incubator for 24 hours. This study introduces the students to clinical research methods made valid through the use of controls. During the remaining two days the classes complete the following activities:

The Shallow Waters of the Sea

During this day of study the children are involved in a field study of ocean and bay littoral zones. The class follows a jeep loaded with nets, buckets, shovels, and other collecting gear to the ocean beach. Here along the ocean shoreline the students collect shells and observe the instructors in wet suits seining the shallow water areas. Specimens are collected by the children from the nets, marine algae specimens (seaweed) are collected in buckets, and several buckets of soil bottom samples are reserved for study on the following day. The group now moves to the bay shoreline and repeats the same study techniques applied in the ocean area. Live specimens for stocking the classroom aquarium are reserved during the collecting period. Two plastic "Jerry" cans are filled with sea water for the class aquarium. The class takes the salt water with them to fill the tanks. The specimens are left at the nature center until the following day. This activity presents the opportunity for individual student interpretation of various ecological zones.

A Laboratory Investigation of the Sea

As the class arrives for this final day of study, they are divided into two groups. One group surrounds an inclined sorting table, and with hoses flush half of the bottom material collected on the previous day through coarse and fine screening trays. Some of the students collect the worms, snails and mollusks caught during the sorting process.

The other half of the class meanwhile fills a battery of shallow pans with water, and following standard techniques for mounting marine algae, arrange the plants as naturally as possible over submerged specimen paper. As the paper is drawn over the edge of the pan, the water drains, and the plants adhere to the paper. Covered with wax paper and pressed in newspaper, the marine plants will become permanently attached to the paper by means of their gelatinous glue. The operation is reversed.

The class now regroups and proceeds to the laboratory. Instructions for preparing and maintaining a salt water aquarium are presented. The students are instructed in the use of the compound microscope and the stereo microscope. With the aid of these instruments, each student examines the plankton sample collected during the first day and the macroscopic marine materials collected at the screening table.

The final portion of the day is devoted to a review of the causes and cures of pollution. The culture dishes prepared on the first day are placed on a transparency projector. The bacterial colonies, easily seen on the screen, are counted by the students. With this information the students conclude which samples were polluted or unpolluted by sewage effluents.

The continuity followed through the sixth grade program hopefully establishes the important relationship between wetland areas and sea life cycles, man's growing dependency on the sea, the numbers and variety of living things found in marine areas, and the importance of wetland, littoral, and marine conservation.

* *

The previously described programs have reached deeply into the community life of our area. Participating classes use their outdoor experiences, not only for science study, but also as a "springboard" for mathematics, English, and other subjects. We have served entire families in our broad range of educational offerings. Adults and children alike have found a program adapted to their needs. Two evening adult programs weekly, three marine biology summer programs for higher grades, and evening and weekend programs for kindergarten through senior citizen groups reach all levels of the society.

Because of the rapid expansion of our program, we have outgrown the present nature center. A 12' x 60' classroom trailer has been acquired to supplement our present quarters. An application for a larger facility is now being processed. This building, some 15,000 square feet in extent, is in the Fort Hancock Military Reservation on Sandy Hook. Two additional teacher-naturalists have been employed to help handle current program expansion. Our staff now consists of four instructors, a secretary, two laboratory technicians, and one custodian. This staff is supplemented by four part-time naturalist-guides employed by the state.

Sandy Hook's programs are in operation throughout the year. We welcome observers to these programs. More specific information about each program may be obtained by addressing a request to :

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Spermaceti Cove Nature Center
Sandy Hook State Park
Box 57
Highlands, New Jersey 07732

At Sandy Hook we have modified the old Chinese adage of "One picture is worth 10,000 words" to also read "One experience is worth 10,000 pictures".